



UNITED STATES PATENT AND TRADEMARK OFFICE

[Handwritten signature]

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,267	02/06/2004	Charles S. Johnson	200302554.1	8669

7590 07/24/2006
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

LE, DIEU-MINH T

ART UNIT	PAPER NUMBER
----------	--------------

2114

DATE MAILED: 07/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/774,267

Applicant(s)

JOHNSON ET AL.

Examiner

Dieu-Minh Le

Art Unit

2114

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2004.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☒ Claim(s) 4-16 is/are allowed.
6) ☒ Claim(s) 1-3 and 17-22 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 06 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02/06/04.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Part III DETAILED ACTION

Specification

1. This Office Action is in response to the application 10/774,267 filed on 02/06/04.

2. Claims 1-22 are presented for examination.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Art Unit: 2114

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3 and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Earl et al. (U.S. 6,954,877 hereafter referred to as Earl) in view of Del Vigna, Jr. (U.S. 5,621,885).

As per claim 1:

Earl substantially teaches the invention. Earl teaches:

- A method of processing a transaction [abstract, fig. 3D, col. 1, lines 1-10]; the method comprising:
- processing a transaction workload in a primary process pair on a first node in a cluster of nodes [fig. 3D, col. 2, lines 10-16; col. 8, lines 33-57];
- the processing using a database stored on at least one stable storage volume [fig. 3D, col. 8, lines 33-57];
- while processing the transaction workload, performing checkpointing operations via the network from the primary process pair to a backup process pair, the backup process pair operating on a second node in the cluster of nodes [col. 2, lines 17-20 and lines 26-28];
- detecting a failure making the first node inoperable or inaccessible; and after detecting the failure, engaging the backup process pair to take over the transaction processing workload of the primary process pair (i.e., fail-over

Art Unit: 2114

process) [abstract, fig. 3D, col.2, lines 10-28 and col. 14, lines 15-36].

Earl does not explicitly address:

- the at least one stable storage volume and the log storage volume forming a log storage group.

However, Earl does disclose capability of:

- A fault tolerant using logical checkpointing in computing system [abstract, fig. 3D, col. 1, lines 1-10 and col. 14, lines 15-36] comprising:
 - a data connectivity among processors via plurality of clients and servers, database volumes, computer interfaces, etc... [fig. 3D, col. 8, lines 33-57].
 - an operating log including history table of data, service sequences, operation checks, missing log entries, etc... in supporting the fault-tolerant fail-over process [fig. 3D, col. 12, lines 55 through col. 13, lines 67].

In addition, Del Vigna, Jr. explicitly teaches:

- A fault-tolerant transaction processing system including process pair and checkpointing techniques [abstract, fig. 3, col. 1, lines 20-31] comprising:
 - an input queue[114] is used to support the capturing and transmitting of data among primary and backup processes [col. 7, lines 11 through col. 8, lines 67].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of Applicant's invention to first realizing Earl's operating log including history table

Art Unit: 2114

of data, service sequences, operation checks, missing log entries, etc... in supporting the fault-tolerant fail-over process as being the log storage group as claimed by Applicant. This is because Earl's data/fault tolerant system explicitly performed data failure detection and recovery via primary and backup process (i.e., failover process). By utilizing these capabilities, the computer system can be directed or redirected promptly and functioned properly during failover switching process in supporting the network operation via its logging function; second, by applying the input queue[114] is used to support the capturing and transmitting of data among primary and backup processes as taught by Del Vigna, Jr. in conjunction with the fault tolerant using logical checkpointing in computing system as taught by Earl, the primary process within fault tolerant networking system including backup capability (i.e., OS failover) can enhance its operation performance, more specifically to ensuring the error detected, corrected, and replaced (i.e., backup) in proper and efficient manner via its checkpointing functionality.

This modification would have been obvious because a person having ordinary skill in the art would have been motivated to do so to improve the fault-tolerant system operation availability and network/system performance therein with a mechanism to enhance the data connectivity, data debugging, data reliability, and data throughput which eventually will increase its performance, such as data throughput between internal and external devices.

As per claim 2:

Earl further teaches:

Art Unit: 2114

- wherein performing checkpointing operations includes communicating checkpointing information by the primary process pair to the backup process pair [col. 2, lines 17-20 and lines 26-28].

In addition, Del Vigna, Jr. explicitly teaches:

- A fault-tolerant transaction processing system including process pair and checkpointing techniques [abstract, fig. 3, col. 1, lines 20-31] comprising:
 - wherein performing checkpointing operations includes communicating checkpointing information by the primary process pair to the backup process pair [col. 8, lines 7-30].

As per claim 3:

Earl further teaches:

- each node in said cluster including at least one server, wherein one of said at least one servers hosts the backup process pair, the hosting server having a cache for holding transaction data [fig. 3D, col. 2, lines 10-16; col. 8, lines 33-57 and col. 3, lines 66 through col. 4, lines 20];
- wherein to prepare the cache for use by the backup process pair when the backup pair takes over the work of the primary process pair [fig. 3D, col. 8, lines 33-57] (i.e., **fail-over process**) [abstract, fig. 3D, col.2, lines 10-28 and col. 14, lines 15-36].

Earl does not explicitly address:

- the cache is loaded with transaction data derived from the log storage volume of the **log storage group**.

Art Unit: 2114

However, Earl does disclose capability of:

- A fault tolerant using logical checkpointing in computing system [abstract, fig. 3D, col. 1, lines 1-10 and col. 14, lines 15-36] comprising:
- a data connectivity among processors via plurality of clients and servers, database volumes, computer interfaces, etc... [fig. 3D, col. 8, lines 33-57].
- an operating log including history table of data, service sequences, operation checks, missing log entries, etc... in supporting the fault-tolerant fail-over process [fig. 3D, col. 12, lines 55 through col. 13, lines 67].

In addition, Del Vigna, Jr. explicitly teaches:

- A fault-tolerant transaction processing system including process pair and checkpointing techniques [abstract, fig. 3, col. 1, lines 20-31] comprising:
- an input queue[114] is used to support the capturing and transmitting of data among primary and backup processes [col. 7, lines 11 through col. 8, lines 67].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of Applicant's invention to first realizing Earl's operating log including history table of data, service sequences, operation checks, missing log entries, etc... in supporting the fault-tolerant fail-over process as being the log storage group as claimed by Applicant. This is because Earl's data/fault tolerant system explicitly performed data failure detection and recovery via primary and backup process (i.e., failover process). By utilizing these capabilities, the computer system can be directed or redirected

promptly and functioned properly during failover switching process in supporting the network operation via its logging function; second, by applying the input queue[114] is used to support the capturing and transmitting of data among primary and backup processes as taught by Del Vigna, Jr. in conjunction with the fault tolerant using logical checkpointing in computing system as taught by Earl, the primary process within fault tolerant networking system including backup capability (i.e., OS failover) can enhance its operation performance, more specifically to ensuring the error detected, corrected, and replaced (i.e., backup) in proper and efficient manner via its checkpointing functionality.

This modification would have been obvious because a person having ordinary skill in the art would have been motivated to do so to improve the system operation availability and network/system performance.

As per claims 17-20:

Due to the similarity of claims 17-20 to claims 1-3 except for a transaction apparatus comprising database volumes, primary and backup processing pairs, log storage group, etc... instead of a method of processing a transaction comprising database volumes, primary and backup processing pairs, log storage group, etc...; therefore, these claims are also rejected under the same rationale applied against claims 1-3. **In addition, all of the limitations have been noted in the rejection as per claims 1-3.**

As per claims 21-22:

Due to the similarity of claims 21-22 to claims 1-3 except for a fault-tolerant cluster of computing nodes comprising means

Art Unit: 2114

for storing database information, means for computing in primary and backup processing pairs, means for storing log information, etc... instead of a method of processing a transaction comprising database volumes, primary and backup processing pairs, log storage group, etc...; therefore, these claims are also rejected under the same rationale applied against claims 1-3. **In addition, all of the limitations have been noted in the rejection as per claims 1-3.**

6. Claims 4-16 are allowable over the prior art of record.

**The following is an Examiner's Statement of
Reasons for Allowance:**

The prior arts of records do not teach nor suggest a method for establishing a plurality of primary process pairs on a first node in a cluster of nodes, each node including one or more servers and being associated with a plurality of stable storage volumes, the plurality of primary process pairs including a plurality of first primary processes and a plurality of first backup processes having the limitations of claim 4 in particular:

- grouping the plurality of stable storage volumes of the first node into a number of groups and assigning a separate audit trail to each group of stable storage volumes, each of the separate audit trails and their associated group of stable storage volumes forming a log storage group, the separate audit trail for each log storage group recording stable storage updates for the stable storage volumes in the log storage group;

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

8. A shortened statutory period for response to this action is set to expired THREE (3) months, ZERO days from the date of this letter. Failure to respond within the period for response will cause the application to be abandoned. 35 U.S.C. 133.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dieu-Minh Le whose telephone number is (703)305-9408. The examiner can normally be reached on Monday - Thursday from 8:30 AM to 6:30 PM.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dieu-Minh Le whose telephone number is (571) 272-3660. The examiner can normally be reached on Monday - Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571)272-3644. The Tech Center 2100 phone number is (571) 272-2100.

Art Unit: 2114

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



DIEU-MINH THAI LE

PRIMARY EXAMINER

ART UNIT 2114

DML

7/20/06